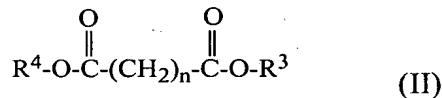


WHAT IS CLAIMED IS:

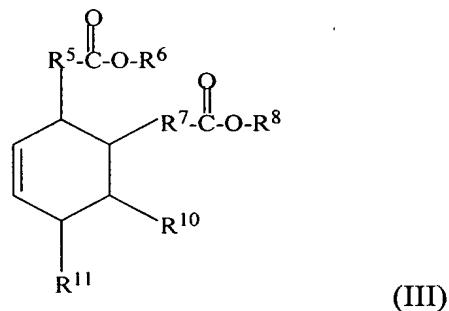
1. A thermoplastic polymeric material composition comprising a thermoplastic polymeric material selected from the group consisting of thermoplastic polymers, thermoplastic polymer alloys, and combinations thereof; and an adhesion promoter containing (1) an adhesive resin in an amount of about 0.1% to about 15% by weight, based on the weight of the thermoplastic polymeric material in the composition; and (2) an ester having formula I, II, III, IV or a combination of any two or more of said esters in an amount of about 0.1% to about 15% by weight, based on the weight of the thermoplastic polymeric material in the composition:



wherein R^1 is a $\text{C}_3\text{-C}_{24}$ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; R^2 is a $\text{C}_3\text{-C}_{24}$ saturated fatty acid residue, or an unsaturated fatty acid residue having 1 to 6 carbon-to-carbon double bonds;



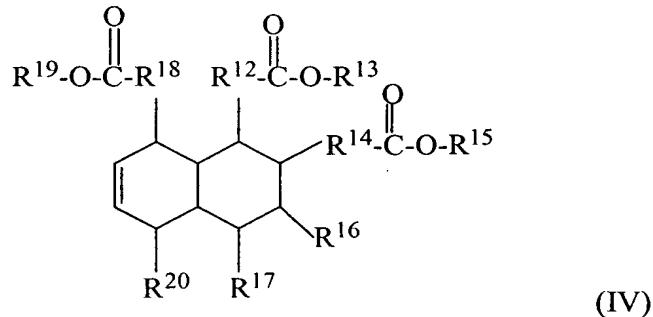
wherein $n=3\text{-}24$, and R^3 and R^4 , same or different, are a $\text{C}_3\text{-C}_{24}$ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds;



wherein R^5 and R^7 , same or different, are a $\text{C}_3\text{-C}_{24}$ hydrocarbon chain, straight chain or branched, either saturated or having 1 to 6 carbon-to-carbon double bonds;

R^6 and R^8 , same or different, are $\text{C}_3\text{-C}_{24}$ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; and

R^{10} and R^{11} , same or different, are a C_3 - C_{24} , saturated hydrocarbon chain, straight chain or branched; or an unsaturated C_3 - C_{24} , hydrocarbon chain, straight chain or branched, having 1 to 6, carbon-to-carbon double bonds;



wherein R^{12} , R^{14} and R^{18} , same or different, are a C_3 - C_{24} hydrocarbon chain, straight chain or branched, either saturated or having 1 to 6 carbon-to-carbon double bonds;

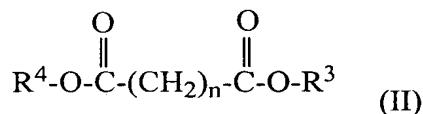
R^{13} , R^{15} and R^{19} , same or different, are a C_3 - C_{24} alkyl, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; and

R^{16} , R^{17} and R^{20} , same or different, are a C_3 - C_{24} saturated hydrocarbon chain, straight chain or branched; or unsaturated C_3 - C_{24} hydrocarbon chain, straight chain or branched, containing 1 to 6 carbon-to-carbon double bonds.

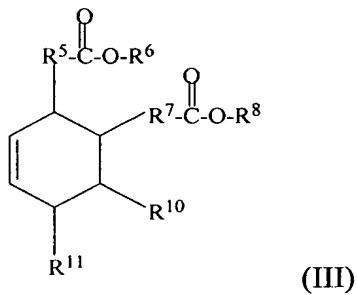
2. A thermoplastic polymeric material composition in accordance with claim 1, wherein the ester is selected from the group consisting of formula I, II, III, IV, and a combination of any two or more of said esters:



wherein R^1 is a C_3 - C_{18} alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; and R^2 is a C_8 - C_{18} saturated fatty acid residue, or an unsaturated fatty acid residue having 1 to 3 carbon-to-carbon double bonds;



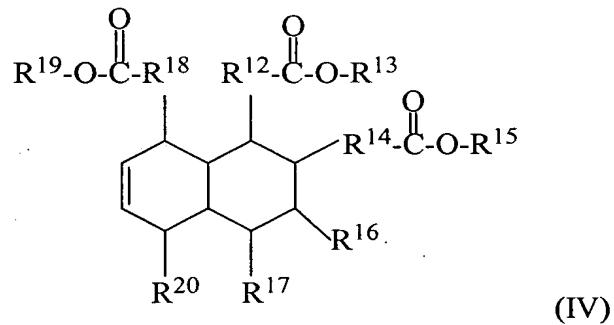
wherein $n=6-18$, and R^3 and R^4 , same or different, are a C_3 - C_{18} alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds;



wherein R⁵ and R⁷, are a C₆-C₂₄ hydrocarbon chain, straight chain or branched; either saturated or having 1 to 3 carbon-to-carbon double bonds;

R⁶ and R⁸, same or different, are a C₃-C₁₈ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; and

R¹⁰ and R¹¹, same or different, are a C₃-C₁₈, saturated hydrocarbon chain, straight chain or branched; or an unsaturated hydrocarbon chain, straight chain or branched, containing 1 to 3 carbon-to-carbon double bonds;



wherein R¹², R¹⁴ and R¹⁸, same or different, are a C₈-C₁₈, hydrocarbon chain, straight chain or branched, either saturated or having 1 to 3 carbon-to-carbon double bonds;

R¹³, R¹⁵ and R¹⁹, same or different, are a C₆-C₁₈ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; and

R¹⁶, R¹⁷ and R²⁰, same or different, are a C₆-C₁₈ saturated hydrocarbon chain, straight chain or branched; or an unsaturated C₆-C₁₈ hydrocarbon chain, straight chain or branched, containing 1 to 3 carbon-to-carbon double bonds.

3. The composition of claim 1, wherein the adhesive resin is a condensation product of a methylene acceptor and a methylene donor.

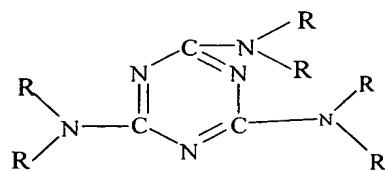
4. The composition of claim 3, wherein the adhesive resin is selected from the group consisting of phenol-formaldehyde, melamine-formaldehyde; naphthol-formaldehyde; polyepoxide; a reaction product of triallyl cyanurate, resorcinol, and formaldehyde; a reaction product of p-chlorophenol, resorcinol, and formaldehyde; a copolymer of styrene, butadiene, and 2-vinylpyridine; and mixtures thereof.

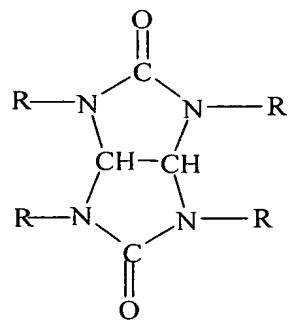
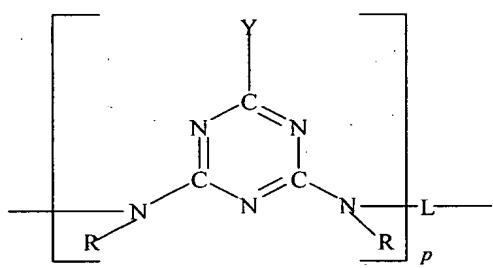
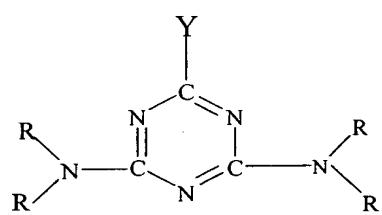
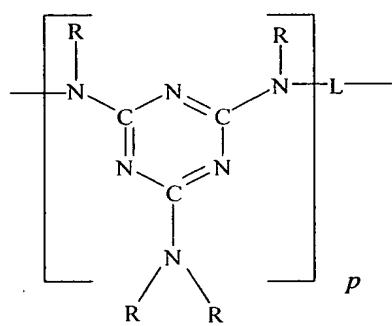
5. The composition of claim 4, wherein the phenol-formaldehyde resin is resorcinol-formaldehyde.

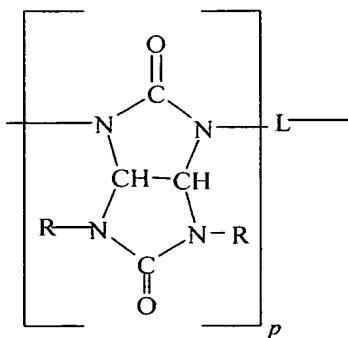
6. The composition of claim 1, wherein the adhesive resin is selected from the group consisting of derivatives of melamine, acetoguanamine, benzoguanamine, cyclohexylguanamine and glycoluril monomers and oligomers of these monomers, which have been substituted on average at two or more positions on the monomer or on each unit of the oligomer with vinyl terminated radicals, the vulcanizable rubber composition being free of resorcinol.

7. The composition of claim 6, wherein at least one of the adhesive resins has been further substituted on average at one or more positions with a radical which comprises carbamoylmethyl or amidomethyl.

8. A composition of claim 6, wherein the adhesive resin is selected from compounds of the formula:

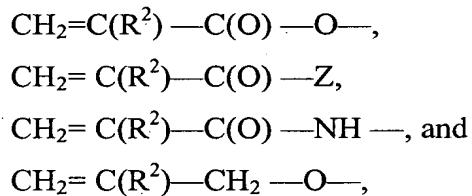




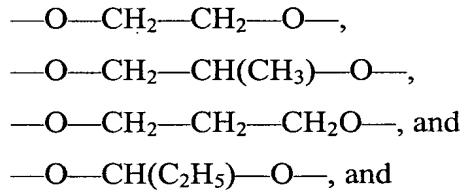


and positional isomers thereof,

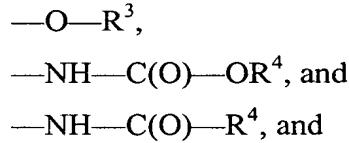
wherein, in each monomer and in each polymerized unit of the oligomers, Y is selected from methyl, phenyl and cyclohexyl, and, on average, at least two R are $-\text{CH}_2-\text{R}^1$, and any remaining R are H, and at least 2 R^1 are radicals selected from



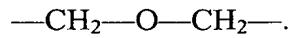
wherein R² is hydrogen or C₁-C₁₈ alkyl, and Z is a radical selected from



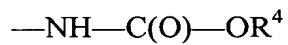
any remaining R^1 radicals are selected from



wherein R₃ is hydrogen or R₄, and R₄ is a C₁-C₁₈ alkyl, alicyclic, hydroxyalkyl, alkoxyalkyl or aromatic radical, and in the oligomers, P is 2 to about 10, and L is methylene or the radical

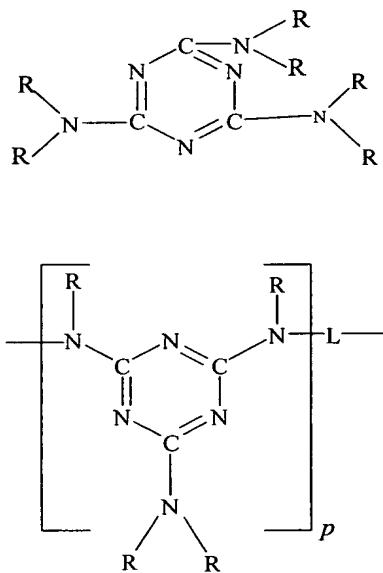


9. The composition of claim 8, wherein on average at least one R¹ in each monomer or in each oligomerized unit of the adhesive resin is:

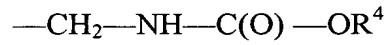


wherein R⁴ is as defined in claim 8.

10. The composition of claim 9, wherein the adhesive resin is a compound of the formula



11. The composition of claim 10, wherein in the adhesive resin formulas, on average at least one R radical in each monomer or in each oligomerized unit is

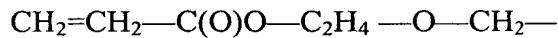


wherein R⁴ is a C₁-C₁₈ alkyl, alicyclic, hydroxyalkyl, alkoxyalkyl or aromatic radical.

12. The composition of claim 10, wherein on average at least two R radicals are selected from



and



and at least one R radical is selected from



and



13. The composition of claim 8, further comprising an additional additive selected from hydroxymethylated and alkoxy methylated (alkoxy having 1-5 carbon atoms) derivatives of melamine, acetoguanamine, benzoguanamine, cyclohexylguanamine and glycoluril and their oligomers.

14. The composition of claim 6, wherein the adhesive resin is a derivative of melamine or an oligomer of melamine.

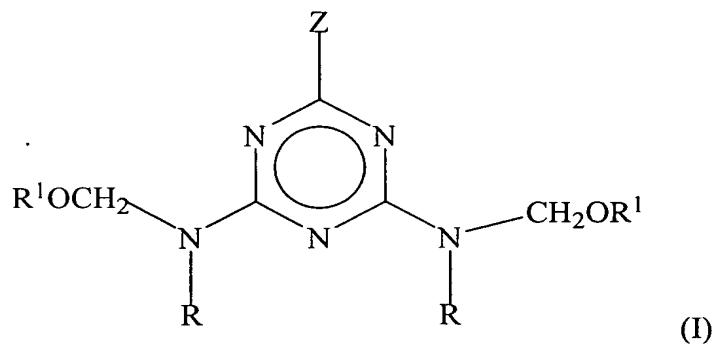
15. The composition of claim 6, wherein the adhesive resin is a derivative of acetoguanamine or an oligomer of acetoguanamine.

16. The composition of claim 6, wherein the adhesive resin is a derivative of benzoguanamine or an oligomer of benzoguanamine.

17. The composition of claim 6, wherein the adhesive resin is a derivative of cyclohexylguanamine or an oligomer of cyclohexylguanamine.

18. The composition of claim 1, wherein the adhesive resin is a self-condensing alkylated triazine resin selected from the group consisting of (i), (ii), and (iii):

(i) a self-condensing alkylated triazine resin having at least one of imino or methylol functionality and represented by formula (I)



(ii) an oligomer of (i), or

(iii) a mixture of (i) and (ii), wherein

Z is $-N(R)(CH_2OR^1)$, aryl having 6 to 10 carbon atoms, alkyl having 1 to 20 carbon atoms or an acetyl group,

each R is independently hydrogen or $-CH_2OR^1$, and

each R^1 is independently hydrogen or an alkyl group having 1 to 12 carbon atoms, provided that at least one R is hydrogen or $-CH_2OH$ and at least one R^1 is selected from the alkyl group; and

wherein the vulcanizable rubber composition is substantially free of methylene acceptor coreactants.

19. The composition of claim 18, wherein at least one R group is hydrogen.

20. The composition of claim 19, wherein at least one R^1 group is a lower alkyl group having 1 to 6 carbon atoms.

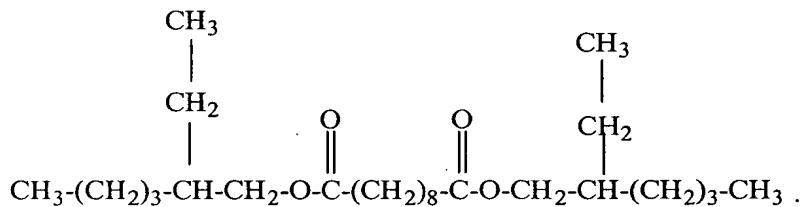
21. The composition of claim 20, wherein the adhesive resin is a derivative of melamine, benzoguanamine, cyclohexylguanamine, or acetoguanamine, or an oligomer thereof.

22. The composition of claim 20, wherein Z is $-N(R)(CH_2OR^1)$.

23. The composition of claim 4, wherein the phenol-formaldehyde resin is resorcinol-formaldehyde; and the melamine-formaldehyde resin is N-(substituted oxymethyl) melamine-formaldehyde.

24. The composition of claim 1, wherein the ester has the formula II and comprises a saturated diester formed by the reaction of sebacic acid and a C₆-C₂₄ alcohol, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds.

25. The composition of claim 24, wherein the alcohol is 2-ethylhexyl alcohol, and the ester has the following formula:



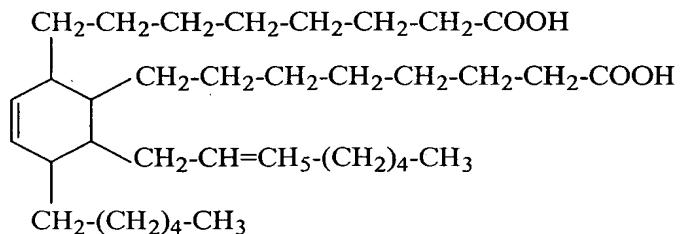
26. The composition of claim 1, wherein the ester is an unsaturated diester formed by the reaction of a C₃₆ dimer acid and a C₃-C₁₈ alcohol, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds.

27. The composition of claim 26, wherein the alcohol is 2-ethylhexyl alcohol.

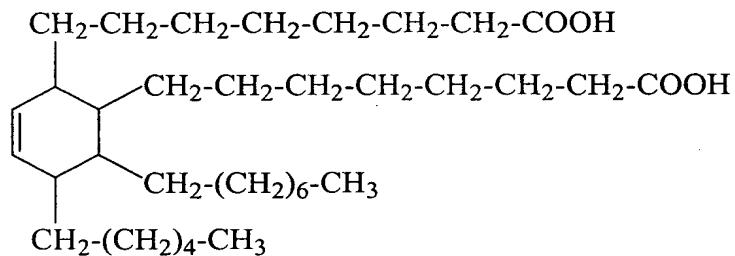
28. The composition of claim 26, wherein the alcohol is tridecyl alcohol.

29. The composition of claim 26, wherein the alcohol is oleyl alcohol.

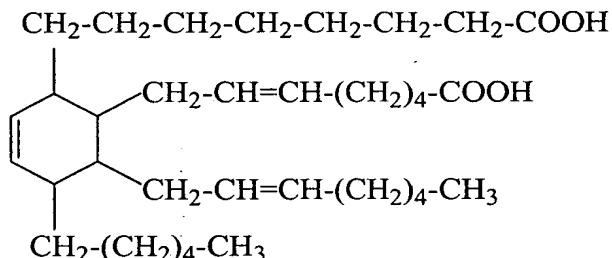
30. The composition of claim 1, wherein the ester comprises the following dimer acid reacted with a C₃-C₂₄ alcohol:



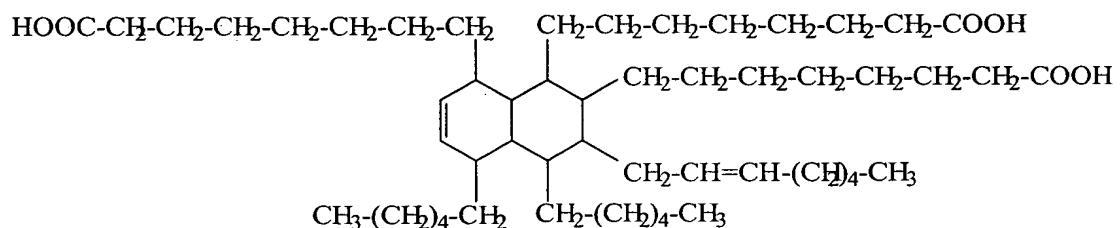
31. The composition of claim 1, wherein the ester comprises the following dimer acid reacted with a C₃-C₂₄ alcohol:



32. The composition of claim 1, wherein the ester comprises the following dimer acid reacted with a C₃-C₂₄ alcohol:



33. The composition of claim 1, wherein the ester is the reaction product of a C₃-C₂₄ alcohol with a tricarboxylic acid, having the following formula:



34. The composition of claim 1, wherein the ester is a combination of compounds of formula I, II, III, and IV.

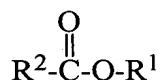
35. The composition of claim 34, wherein the ester is a reaction product of a C₃-C₂₄ alcohol straight chain or branched, saturated or unsaturated having 1 to 3 carbon-to-carbon double bonds, with a dimer acid having CAS #61788-89-4.

36. The composition of claim 35, wherein the alcohol is 2-ethylhexyl alcohol.
37. The composition of claim 35, wherein the alcohol is a tridecyl alcohol.
38. The composition of claim 35, wherein the alcohol is an oleyl alcohol.
39. The composition of claim 1, wherein the adhesion promoter is a liquid selected from the group consisting of a solvent solution and a water-based emulsion.
40. The composition of claim 39, wherein the adhesion promoter is a solvent solution comprising 2-ethylhexyl alcohol.
41. The composition of claim 1, wherein the adhesion promoter is mixed with a solid, inert carrier.
42. The composition of claim 41, wherein the solid, inert carrier is calcium silicate.
43. The composition of claim 1, further comprising a reactive diluent in an amount of about 0.5% to about 50% by weight, based on the total weight of the adhesion promoter.
44. The composition of claim 41, wherein the reactive diluent is a monomer selected from the group consisting of (1) a glycidyl ether; (2) a diglycidyl ether; (3) an aliphatic, straight chain epoxide; (4) an epoxidized vegetable oil; (5) a cycloaliphatic epoxy; (6) a glycidyl ester; (7) a diglycidyl ester; and any combination thereof.
45. A cord-reinforced article of manufacture comprising a plurality of cords selected from polymeric cords, metal cords, glass cords, and a combination thereof, adhered to the thermoplastic polymeric material composition of claim 1.
46. The composition of claim 1, wherein the R^2 , R^5 , R^7 , R^{12} , R^{14} are fatty acid residues derived from animal or vegetable fatty acids.

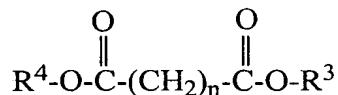
47. The composition of claim 46, wherein the fatty acids are selected from the group consisting of butter; lard; tallow; grease; herring; menhaden; pilchard; sardine; babassu; castor; coconut; corn; cottonseed; jojoba; linseed; oiticica; olive; palm; palm kernel; peanut; rapeseed; safflower; soya; sunflower; tall; tung; and mixtures thereof.

48. The composition of claim 47, wherein the fatty acid residues are selected from the group consisting of hexanoic; octanoic; decanoic; dodecanoic; 9-dodecenoic; tetradecanoic; 9-tetradecenoic; hexadecanoic; 9-hexadecenoic; octadecanoic; 9-octadecenoic; 9-octadecenoic, 12-hydroxy; 9, 12-octadecadienoic; 9, 12, 15-octadecatrienoic; 9, 11, 13-octadecatrienoic; 9, 11, 13-octadecatrienoic, 4-oxo; octadecatetrenoic; eicosanoic; 11-eicosenoic; eicosadienoic; eicosatrienoic; 5, 8, 11, 14-eicosatetraenoic; eicosapentaenoic; docosanoic; 13-docosenoic; docosatetraenoic; 4, 8, 12, 15, 19-docosapentaenoic; docosahexaenoic; tetracosenoic; and 4, 8, 12, 15, 18, 21-tetracosahexaenoic.

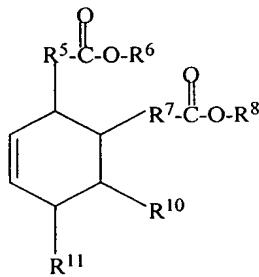
49. A method of increasing the adhesion of a thermoplastic polymeric material composition to a polymer, glass, or metal substrate, said thermoplastic polymeric material composition comprising a thermoplastic polymeric material selected from the group consisting of thermoplastic polymers, thermoplastic polymer alloys, and combinations thereof, and an adhesive resin, comprising adding to said thermoplastic polymeric material composition, in an amount of about 0.1% to 15% by weight, based on the weight of the rubber, an ester having formula I, II, III, IV, or mixtures thereof:



wherein R^1 is a $\text{C}_3\text{-C}_{24}$ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; R^2 is a $\text{C}_3\text{-C}_{24}$ saturated fatty acid residue, or an unsaturated fatty acid residue having 1 to 6 carbon-to-carbon double bonds;



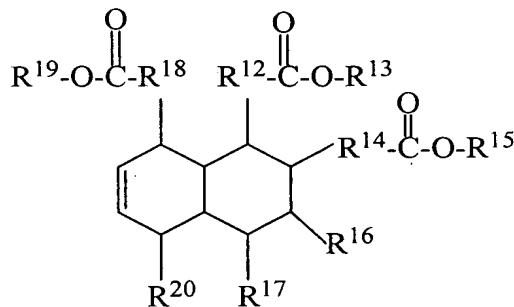
wherein $n=3\text{-}24$ and R^3 and R^4 , same or different, are a $\text{C}_3\text{-C}_{24}$ alkyl radical, straight chain or branched;



wherein R⁵ and R⁷, same or different, are a C₃-C₂₄ hydro carbon chain, straight chain or branched, either saturated or having 1 to 6 carbon-to-carbon double bonds;

R⁶ and R⁸, same or different, are a C₃-C₂₄ alkyl radical, straight chain or branched; and

R¹⁰ and R¹¹, same or different, are a C₃-C₂₄, saturated hydrocarbon chain, straight chain or branched; or an unsaturated C₃-C₂₄, hydrocarbon chain, straight chain or branched, having 1 to 6 carbon-to-carbon double bonds;



wherein R¹², R¹⁴ and R¹⁸, same or different, are a C₃-C₂₄ hydrocarbon chain, straight chain or branched, either saturated or having 1 to 6 carbon-to-carbon double bonds;

R¹³, R¹⁵ and R¹⁹, same or different, are C₃-C₂₄ alkyl radical, straight chain or branched, saturated or unsaturated containing 1 to 3 carbon-to-carbon double bonds; and

R¹⁶, R¹⁷ and R²⁰, same or different, are C₃-C₂₄ saturated hydrocarbon chain, straight chain or branched; or unsaturated C₃-C₂₄ hydrocarbon chain, straight chain or branched, containing 1 to 6 carbon-to-carbon double bonds.

50. The method of claim 49, wherein the substrate is a plurality of cords.

51. The method of claim 49, wherein the substrate is a polymeric sheet or fabric.
52. The method of claim 49, wherein the substrate is metal flat stock material.
53. The method of claim 49, wherein the adding comprises adding a liquid comprising the adhesive resin and the ester having Formula I, II, III, IV, or mixtures thereof, and the liquid is selected from the group consisting of a solvent solution and a water-based emulsion.
54. The method of claim 53, is a solvent solution comprising 2-ethylhexyl alcohol.
55. The method of claim 53, wherein the liquid is a solvent solution further comprising a reactive diluent in an amount of about 0.5% to about 50% by weight, based on the total weight of the adhesive resin and the ester having Formula I, II, III, IV, or mixtures thereof.
56. The method of claim 55, wherein the reactive diluent is a monomer selected from the group consisting of (1) a glycidyl ether; (2) a diglycidyl ether; (3) an aliphatic, straight chain epoxide; (4) an epoxidized vegetable oil; (5) a cycloaliphatic epoxy; (6) a glycidyl ester; (7) a diglycidyl ester; and any combination thereof.
57. The method of claim 49, wherein the adding comprises adding a mixture of the adhesive resin and the ester having Formula I, II, III, IV, or mixtures thereof, and a solid, inert carrier.
58. The method of claim 49, wherein the thermoplastic polymeric material is heated to a temperature sufficient to melt the thermoplastic material.